

# Claims

- [c1] A valve comprising:
- first and second ports and a flow path therebetween;
  - a valve seat formed about one of said ports;
  - a valve member that is selectively moved into and out of sealing engagement with said valve seat;
  - an actuator coupled to said valve member to move said valve member into and out of sealing engagement with said valve seat; and
  - an adjustable mechanism which cooperates with said actuator to determine the axial movement of the actuator and the valve member.
- [c2] The valve of claim 1, wherein the adjustable mechanism includes an adjustor which is a rod-like member that threadably engages said actuator.
- [c3] The valve of claim 1, wherein the adjustable mechanism includes is a stem located on the top portion of said actuator.
- [c4] The valve of claim 1, wherein the adjustable mechanism includes a shaft that contacts a portion of the actuator.

- [c5] The valve of claim 4, wherein said portion of said actuator is raised above a top surface of said actuator.
- [c6] The valve of claim 2, wherein said adjustable mechanism comprises a first lock nut that is threadably engaged on said adjustor.
- [c7] The valve of claim 6, wherein said first lock nut engages a portion of a valve housing when located on a first position of said adjustor, wherein said engagement with said valve housing prevents the valve member from engaging said valve seat.
- [c8] The valve of claim 7 further comprising a second lock nut that engages said first lock nut to prevent rotation thereof.
- [c9] The valve of claim 1, wherein said adjustable mechanism comprises a first set screw that threadably engages a portion of a valve housing.
- [c10] The valve of claim 1 further comprising a second set screw that engages said first set screw to prevent rotation thereof.
- [c11] The valve of claim 1, wherein said adjustable mechanism comprises a one-piece adjustable port that is threaded into a top portion of a valve housing.

- [c12] The valve of claim 11, wherein said one-piece adjustable port comprises a shaft that engages a portion of said actuator.
- [c13] The valve of claim 12, wherein said one-piece adjustable port engages said actuator to prevent the piston from moving in the axial direction.
- [c14] The valve of claim 1, wherein said adjustable mechanism comprises a two-piece adjustable port that is threaded into a top portion of a valve housing.
- [c15] The valve of claim 1 further comprising an end cap that is threaded onto a valve housing.
- [c16] The valve of claim 15, wherein said end cap is selectively positioned to determine the axial movement of the actuator and valve member.
- [c17] The valve of claim 1, wherein said adjustable mechanism is positioned to prevent said valve member from sealing against the valve seat when the valve is in a closed position.
- [c18] A valve comprising:  
three fluid ports, each having a fluid passageway;  
a connecting fluid passageway wherein each of said port fluid passageways connect to said connecting fluid pas-

sageway;

a valve element including two sealing members, one sealing member which seals against a first valve seat located at a first end of said connecting fluid passageway when said valve element is in a first position and one sealing member which seals against a second valve seat located at a second end of said connecting fluid passageway when said valve element is in a second position;

a piston connected to said valve element; and

an adjustable mechanism which is selectively positioned to determine the axial movement of the valve element.

[c19] The valve of claim 18, wherein when said valve element is in a third position, neither the first nor second sealing members seal against their respective valve seats.

[c20] A valve actuator including:

at least one piston contained within an actuator housing;

and

an adjustable mechanism that selectively engages at least a portion of said at least one piston to selectively adjust axial movement of said at least one piston.

[c21] The valve actuator of claim 20, wherein said adjustable mechanism comprises one or more set screws.

[c22] The valve actuator of claim 20, wherein said adjustable

mechanism is a one-piece port.

[c23] The valve actuator of claim 20, wherein said adjustable mechanism is a two-piece port.

[c24] The valve actuator of claim 20 further comprising an end cap threadably mounted to said actuator housing.

[c25] The valve actuator of claim 24, wherein said end cap can be selectively positioned to determine the axial movement of said one or more pistons.

[c26] The valve actuator of claim 24 further comprising a nut member that locks the end cap in position on said actuator housing.

[c27] A valve comprising:  
at least two ports and fluid passageways therebetween;  
a valve member that includes a portion that aligns with at least one of said ports to determine the flow through said fluid passageways;  
a piston that cooperates with said valve member to selectively move said valve member axially towards and away from said at least one of said fluid passageways;  
a means for preventing said portion of said valve member from sealing against said at least one of said fluid passageways thereby preventing flow through said at least one of said fluid passageways.

- [c28] A valve comprising:  
at least one port;  
a valve element that includes a portion that aligns with said at least one port to control the flow therethrough;  
a piston that cooperates with said valve element to selectively move said valve element axially towards and away from said at least one port;  
a means for adjusting the force required to move said valve element away from said at least one port.
- [c29] The valve of claim 28 wherein said means for adjusting the force required to move said valve element away from said at least one port comprises a spring and a spring engagement surface, wherein the position of said spring engagement surface can be adjusted axially to compress or allow expansion of said spring.
- [c30] A valve comprising:  
a diaphragm that is axially moved into and out of engagement with a valve seat;  
a piston coupled with said diaphragm, said piston movable axially a total piston movement distance; and  
a means for adjusting said total piston movement distance.
- [c31] The valve of claim 30, wherein the total piston move-

ment distance is less than the distance required to seal said diaphragm against said valve seat.

[c32] A valve comprising:  
three or more fluid ports, each having a fluid passageway;  
a connecting fluid passageway wherein each of said port fluid passageways flow;  
a diaphragm element including two engagement members, a first engagement member which engages a first valve seat located at a first end of said connecting fluid passageway and a second engagement member which engages a second valve seat located at a second end of said connecting fluid passageway; and  
a piston connected to said diaphragm element and axially movable to selectively position said diaphragm member in a first position wherein said first engagement member engages said first valve seat, a second position wherein said second engagement member engages said second valve seat, or a third position between said first and second positions.

[c33] An actuator comprising:  
a piston coupled to a valve member, said piston movable axially a total piston movement distance; and  
a means for adjusting said total piston movement distance.

- [c34] A valve assembly comprising:  
an actuator having a stroke equal to a first distance;  
a valve including a valve member that selectively engages at least one port to control flow through said valve, said valve member having a stroke equal to a second distance; and  
a means for adjusting the stroke of said actuator.
- [c35] The valve assembly of claim 34 wherein said first distance is greater than said second distance.
- [c36] The valve assembly of claim 34 wherein said means for adjusting the stroke of said actuator is used to make said first distance substantially equal to said second distance.
- [c37] The valve assembly of claim 34 wherein said means for adjusting the stroke of said actuator is accessible from an outside portion of said valve assembly.
- [c38] A valve assembly comprising:  
an actuator;  
a valve including a valve member that selectively engages at least one port to control flow through said valve, said valve member being coupled to said actuator;  
and  
an adjustment mechanism that controls an axial dis-



placement of said actuator, wherein said adjustment mechanism is accessible from an outside portion of said valve assembly.

[c39] A valve assembly comprising:  
three or more ports;  
a valve member that selectively control flow between said three or more ports; and  
an adjustment mechanism that controls the relative flow between said three or more ports.